Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A radial turbine comprising:

a ~~an outer~~ casing[[;]] which covers all of a scroll, a shell and a diffuser while leaving a space therebetween, the diffuser connecting with the shell, the ~~a~~ scroll being mounted inside the ~~outer~~ casing ~~which forms~~ to form a first part of a combustion gas flow path for guiding a combustion gas generated in a combustor to a nozzle which injects the combustion gas to a radial impeller on an inner side in a radial direction of a rotary shaft~~;~~, the ~~a~~ shell ~~which covers~~covering the nozzle and the impeller and ~~forms~~ forming a second part of the combustion gas flow path;

an airtight air flow path formed in said space ~~between outside air~~ in a substantially airtight state ~~inside the casing~~;

an air take-in hole formed in the casing, which takes in air into the airtight air flow path from the outside of the casing;

a combustor outer cylinder mounted to~~outside~~ the ~~outer~~ casing;

a combustor liner mounted inside the combustor outer cylinder, which is communicated with the scroll and guides the combustion gas into the scroll;

a blow-off hole which guides a first part of the air taken into the airtight air flow path, into the combustor liner; and

through holes extending through the shell from the airtight air flow path on both sides of the nozzle adjacent a front edge of the nozzle and inclined at an angle toward a direction of flow of the combustion gas to inject a second part of the air taken into the airtight air flow path into the combustion gas passing through the nozzle, wherein

the nozzle includes a circular blade cascade in which a number of blades are arranged in a row in a circumference thereof and of which a center is a turbine rotary shaft, and the through holes extending through the shell include a plurality of through holes along a surface of each blade of the circular blade cascade.

2. (Original) The radial turbine according to claim 1, characterized in that the air flow path is formed to cover an outer side of the combustion gas flow path communicating from the combustor to the shell.

3. (Previously Presented) The radial turbine according to claim 1 characterized in that the air flow path is formed to cover an outer side of the combustion gas flow path communicating from the combustor to the shell, and the through-holes are formed in walls of the shell at a portion upstream of the nozzle.

4. (Canceled)

5. (Previously Presented) The radial turbine according to claim 1, characterized in that a plurality of the through-holes are arranged in parallel along a direction of flow of the combustion gas flow path.

6-8. (Canceled)

9. (Original) The radial turbine according to claim 1, characterized by further comprising: a through-hole which leads from one side of the air flow path sandwiching the combustion gas flow path to the other side of the air flow path while penetrating a wall of the shell, a blade thick portion of the nozzle and a wall of the shell on the other side; and a leakage hole which leads from the blade thick portion of the nozzle of the through-hole to a surface of the nozzle.

10. (Currently Amended) A radial turbine comprising:

a ~~an outer~~ casing which covers all of a scroll, a shell and a diffuser while leaving a space therebetween, the diffuser being connected to the shell, the scroll forming a first part of a combustion gas flow path for supplying the combustion gas generated in the combustor liner to a turbine nozzle which accelerates the combustion gas toward an inner side in a radial direction of a rotary shaft and supplies the combustion gas to a radial turbine impeller and the shell covering the turbine nozzle and the radial turbine impeller;

a combustor liner in which compressed air and a fuel are mixed and combusted to generate a combustion gas;

~~a turbine scroll which forms a first part of a combustion gas flow path for supplying the combustion gas generated in the combustor liner to a turbine nozzle which accelerates the combustion gas toward an inner side in a radial direction of a rotary shaft and supplies the combustion gas to a radial turbine compeller;~~

~~a turbine shell which covers the turbine nozzle and the radial turbine impeller;~~

an airtight air flow path formed in ~~inside~~ the space ~~outer casing~~;

an air take-in hole which takes air into the air flow path from the outside of the casing;

a combustor outer cylinder mounted to ~~outside~~ the ~~outer~~ casing, said combustor liner being mounted inside the combustor outer cylinder and being communicated with the scroll to guide the combustion gas into the scroll;

a blow-off hole which guides a first part of the airtight air taken into the air flow path, into the combustor liner; and

through holes extending through the shell from the airtight air flow path on both sides of the nozzle adjacent a front edge of the nozzle and inclined at an angle toward a direction of flow of the combustion gas to inject a second part of the airtight air taken into the air flow path into the combustion gas passing through the nozzle, wherein

the nozzle includes a circular blade cascade in which a number of blades are arranged in a row in a circumference thereof and of which a center is a turbine rotary shaft, and the through holes extending through the shell include a plurality of through holes along a surface of each blade of the circular blade cascade.

11. (Previously Presented) The radial turbine according to claim 10, characterized in that the air flow path is formed by the casing so as to cover an outer side of the combustion gas flow path communicating from the combustor to the shell.

12. (Previously Presented) The radial turbine according to claim 10, characterized in that the air flow path is formed to cover an outer side of the combustion gas flow path communicating from the combustor to the shell, and the through-holes are formed in the walls of the shell at a portion upstream of the nozzle.

13. (Canceled)

14. (Previously Presented) The radial turbine according to claim 10, characterized in that a plurality of the through-holes are arranged in parallel along direction of flow of the combustion gas flow path.

15-17. (Canceled)

18. (Original) The radial turbine according to claim 10, characterized by further comprising: a through-hole which leads from one side of the air flow path sandwiching the combustion gas flow path to the other side of the air flow path while penetrating a wall of the shell, a blade thick portion of the nozzle and a wall of the shell on the other side; and a leakage hole which leads from the blade thick portion of the nozzle of the through-hole to a surface of the nozzle.

19. (Currently Amended) A method of cooling a nozzle of a radial turbine including the steps of:

guiding a combustion gas from a combustor liner, which is mounted inside of a combustor outer cylinder mounted ~~outside an outer~~ to a casing, to a nozzle through a combustion gas flow path including a scroll communicated with a combustor liner;

injecting the combustion gas to a radial impeller on an inner side in a radial direction from the nozzle, ;

taking in air from the outside of the casing into an airtight air flow path formed outside the combustion gas flow path;

guiding a first part of the air taken into the air flow path, to the combustor; and

injecting a second part of the air taken into the airtight air flow path, into the combustion gas at a position on both sides of the nozzle adjacent a front edge of the nozzle at an angle inclined toward a direction of flow of the combustion gas.

20. (Previously Presented) The method of cooling a nozzle of a radial turbine according to claim 19, characterized in that the step of injecting the second part of the air on both sides of the nozzle in the combustion gas flow path includes a step of injecting the second part of the air along a surface of a blade forming the nozzle.